GEORGIA INSTITUTE OF TECHNOLOGY — OFFICE OF CONTRACT ADMINISTRATION

PROJECT ADMINISTRATION DATA SHEET

[X] ORIGINAL [ ] REVISION NO. _____

Project No. A-3527 GTRI/~~GHX~~ DATE 4/29/83

Project Director: J. A. Gagliano ~~School~~/Lab EML

Sponsor: Lockheed Missiles & Space Company

Type Agreement: Subcontract No. SB80C6800R under NASA Prime

Award Period: From 4/13/83 To ~~10/31/83~~ 1-31-84 (Performance) --- (Reports)

Sponsor Amount: Total Estimated: $ 24,695 Funded: $ 24,695

Cost Sharing Amount: $ _____ Cost Sharing No: _____

Title: Advanced Microwave Moisture Sounder

ADMINISTRATIVE DATA

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Defense Priority Rating: _____

Military Security Classification: _____
(or) Company/Industrial Proprietary: _____

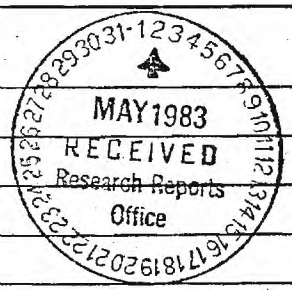
RESTRICTIONS

See Attached _____ Supplemental Information Sheet for Additional Requirements.

Travel: Foreign travel must have prior approval — Contact OCA in each case. Domestic travel requires sponsor approval where total will exceed greater of $500 or 125% of approved proposal budget category.

Equipment: Title vests with None proposed

COMMENTS:



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FORM OCA 4:781 (Rev 982)

GEORGIA INSTITUTE OF TECHNOLOGY OFFICE OF CONTRACT ADMINISTRATION

SPONSORED PROJECT TERMINATION/CLOSEOUT SHEET

Date February 9, 1984

Project No. A-3527 ~~School~~/Lab EML

Includes Subproject No.(s) _____

Project Director(s) Gagliano GTRI / ~~GIT~~

Sponsor Lockheed Missiles & Space Co., Inc.

Title Advance Microwave Moisture Sounder

Effective Completion Date: 1/31/84 (Performance) 1/31/84 (Reports)

Grant/Contract Closeout Actions Remaining:

- [ ] None
- [X] Final Invoice ~~or Final Fiscal Report~~
- [ ] Closing Documents
- [ ] Final Report of Inventions
- [ ] Govt. Property Inventory & Related Certificate
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- [ ] Other _____

Continues Project No. _____ Continued by Project No. _____

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Form OCA 60:1028

Monthly Letter Report No.

Report Period

Report Prepared

ADVANCED MICROWAVE MOISTURE SOUNDER

J.A. Gagliano

Subcontract No. SB80C6800R
(A-3527)

Prepared For

Lockheed Research Laboratories
3251 Hanover Street
Palo Alto, CA 94304

Prepared BY

Engineering Experiment Station
Georgia Institute of Technology
Atlanta, Georgia 30332

WORK PERFORMED DURING THIS PERIOD

The Advanced Microwave Moisture Sounder (AMMS) was mechanically restored to its ER-2/U-2 flight configuration following the recently completed CV-990 data flights for NASA/GSFC. The re-configuration included the removal of the pressure sealed IF package cover, dry nitrogen purge tubing into the RF package and the cold calibration load, and the DC motor/blower for the cold load.

The new software routines for the AMMS scanner are under development. The initial scanner modification performed has reduced the existing scan/retrace cycle from approximately 3 seconds to 1.5 seconds. The scan angle of ± 45 degrees was maintained which means the dwell time (integration time) per pixel was reduced from 60 msec to 30 msec. This change effectively increased the AMMS temperature resolution (ΔT_{min}) by approximately 1.414.

A list of support equipment required for the AMMS during the upcoming August 1983 ER-2 flights at NASA/AMES was prepared. Lockheed will need to supply the necessary support equipment at NASA/AMES during the August flights. Table 1 is a list of test equipment required.

PROBLEMS ENCOUNTERED DURING THIS PERIOD

No problems to report at this time.

WORK TO BE PERFORMED DURING THE NEXT PERIOD

The scanner routine software changes will continue. The next proposed change involves reducing the scan angle proportionally to the reduced scan/retrace time in order to maintain a constant integration time, and thus a constant

ΔT_{min}. For instance, a scan/retrace cycle of 1.5 seconds implies that the scan angle becomes ± 22.5 degrees in order to hold ΔT_{min} constant.

Laboratory measurements on the AMMS system performance on all four data channels will be accomplished. If time permits, a series of tests will be performed outside to determine the cold sky calibration brightness temperatures for the radiometer.

Table 1. AMMS Support Equipment Required at NASA/AMES During the August 1983 ER-2 Data Flights

Item No.	Part No.*	Description
1	Perkin Elmer 550	CRT Terminal
2	T.I. 700 or Epson MX100	Line Printer
3	Datum Model	IRIGB Time Code Generator
4	Tektronix Model	Dual Channel Oscilloscope

*Part Nos. are for equipment previously used with AMMS.

Monthly Letter Report No. 2

Report Period

13 May through 13 June 1983

Report Prepared

28 June 1983

ADVANCED MICROWAVE MOISTURE SOUNDER

J.A. Gagliano

Subcontract No. SB80C6800R
(A-3527)

Prepared For

Lockheed Research Laboratories
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WORK PERFORMED DURING THIS PERIOD

The AMMS scanner software has been modified to provide for changes in the total scan angle, the number of pixels (samples) per scan angle, and the integration or dwell time per pixel position. These changes were implemented by modifying the AMMS operating system software presently stored on the first data block of the flight cartridge. This allows for the AMMS scanner routines to be changed between data flights simply by re-initializing the cartridges before installing them in the flight recorder.

Table 1 provides a summary of the modifications which can be performed using the new AMMS scanner software. This table assumes an aircraft speed of 460 mph and considers two basic approaches. Case A assumes that the radiometer's integration time (τ) is fixed at 60 msec so as to maintain a constant ΔT_{min} of 1.5K at 94 GHz. The number of pixels required for contiguous mapping and for X2 oversampling are given. In addition, the swath path in feet at each aircraft altitude is provided. Case B assumes that the radiometer's scan angle is fixed at 90° (50 pixels). The integration time is determined at each altitude for both contiguous and X2 oversampling.

Assuming that the aircraft velocity is variable to the extent that the average speed is a minimum of 360 mph and a maximum of 460 mph, the scan parameters would differ from the values given in Table 1. Once the aircraft velocity is selected within the assumed range, then the scan parameters can be determined. Table 2 illustrates the range for the pixels (Case A) and for ΔT_{min} (Case B) under the conditions of contiguous mapping or X2 oversampling.

Table 1. Summary of AMMS Scanning Parameters at 94 GHz

Altitude in feet for A/C Speed of 460 mph	Case A: Fixed ΔT_{min} of 1.5K at 94 GHz (τ = 60 ms)				Case B: Fixed Scan Angle of 90 Degrees (50 pixels)					
	Contiguous		X2 Oversample		Contiguous			X2 Oversample		
	# Pixels	Swath(ft)	# Pixels	Swath(ft)	τ (ms)	Swath(ft)	ΔT_{min} (K)	τ (ms)	Swath(ft)	ΔT_{min} (K)
70,000	50	140,000	26	60,583	60	140,000	1.50	30	140,000	2.12
65,000	46	114,610	24	51,471	54	130,000	1.58	27	130,000	2.24
60,000	42	93,082	22	43,203	48	120,000	1.68	24	120,000	2.37
55,000	40	79,920	20	35,741	42	110,000	1.79	21	110,000	2.54
50,000	36	63,462	18	29,053	42	100,000	1.79	21	100,000	2.54
45,000	32	49,478	16	23,108	36	90,000	1.94	18	90,000	2.74
40,000	28	37,645	14	17,882	30	80,000	2.12	15	80,000	3.00
35,000	24	27,715	12	13,353	24	70,000	2.37	12	70,000	3.35
30,000	20	19,495	10	9,503	24	60,000	2.37	12	60,000	3.35

Table 2. Variation in the AMMS Scan Parameters due to the Change in Aircraft Velocity (360 to 460 mph)

	Case A		Case B	
	Pixel Range * for ΔT_{min} = 1.5K		ΔT_{min} Range** for 50 Pixels (90° scan)	
Altitude (feet)	Contiguous	X2 Oversample	Contiguous	X2 Oversample
70,000	50-64	26-32	1.32-1.50	1.86-2.12
65,000	46-60	24-30	1.37-1.58	1.94-2.24
60,000	42-56	22-28	1.43-1.68	2.02-2.37
55,000	40-50	20-26	1.50-1.79	2.12-2.54
50,000	36-46	18-22	1.58-1.79	2.24-2.54
45,000	32-40	16-20	1.68-1.94	2.37-2.74
40,000	28-36	14-18	1.79-2.12	2.54-3.00
35,000	24-32	12-16	1.94-2.37	2.74-3.35
30,000	20-28	10-14	2.02-2.37	3.00-3.35

* # pixels decreases with increase in velocity

** ΔT_{min} increases with increase in velocity

PROBLEMS ENCOUNTERED DURING THIS PERIOD

Word was received from NASA-Goddard Space Flight Center that the ER-2 data flights have been delayed until mid-September 1983. This does not impact the current subcontract end date of October 31, 1983. However, the data flight schedule will be closely monitored to insure that the Georgia Tech field support of the AMMS/ER-2 data mission can be performed within the current end date.

WORK TO BE PERFORMED DURING THE NEXT PERIOD

Efforts will be made to perform a set of sky calibration measurements with the AMMS to set the system gain and offset temperatures on all four data channels. The AMMS will operate in the "stare" mode at various angles from the zenith during the sky measurements.

Calculations of minimum target size detectable using the AMMS will be performed based on various altitudes and velocities for the ER-2 aircraft. The calculations will consider the impact of adverse weather (fog, clouds, and light rain) on the target detection at 94 GHz. The effect of signal-to-noise criteria on the detection process will also be considered.

WORK PERFORMED DURING THIS PERIOD

Calculations for "minimum detectable target size" using the AMMS 94 GHz data channel were performed. For the radiometer viewing in the nadir direction onboard the ER-2, the minimum detectable target area (A_T) is given by:

$$A_T(\text{nadir}) = \frac{\pi}{4}\left(\frac{\pi\theta h}{180}\right)^2 \left(\frac{nL\Delta T_{min}}{T_C}\right) \qquad (1)$$

where θ = 3 dB beamwidth = 1.76° at 94 GHz

h = ER-2 aircraft altitude = 70,000 feet maximum

n = desired signal-to-noise ratio = 2 (3 dB)

L = atmospheric loss ratio from radiometer to surface
= 0.2 dB/km in clear weather at 94 GHz

ΔT_{min} = 1.30 K at 94 GHz for 60 msec integration time

T_C = target contrast temperature.

The target contrast temperature (T_C) is given by:

$$T_C = (\varepsilon_T - \varepsilon_B)\left\{T_B - \left[\frac{T_S}{L_1} + T_P\left(1 - \frac{1}{L_1}\right)\right]\right\} \qquad (2)$$

where ε_T = target emissivity

ε_B = background emissivity

$(\varepsilon_T - \varepsilon_B)$ = 0.9 for metal target with grass background

T_B = background temperature = 300 K

L_1 = atmospheric loss ratio from zenith to surface
= 2.0 dB/km in clear weather at 94 GHz

T_P = average atmospheric temperature = 250 K

T_S = cosmic background temperature = 2.7 K.

Therefore from equation (2),

$$T_C = 0.9\left\{300\ K - \left[\frac{2.7\ K}{1.585} + 250\ K\left(1 - \frac{1}{1.585}\right)\right]\right\}$$

$$= 84.6\ K.$$

From equation (1),

$$A_T(\text{nadir}) = \frac{\pi}{4}\left[\frac{\pi(1.76)(70{,}000)}{180}\right]^2\left[\frac{2(1.585)(1.30)}{84.6}\right]$$

$$= 176{,}888 \text{ ft}^2.$$

For target diameter (D_T), then

$$D_T(\text{nadir}) = \left(\frac{4}{\pi} A_T\right)^{\frac{1}{2}}$$

$$= 475 \text{ ft.}$$

For a non-metal target (such as an airstrip) with the same grass background, then $(\varepsilon_T - \varepsilon_B)$ is approximately 0.5 which reduces T_C to 47 K according to equation (2). Substituting T_C = 47 K into equation (1) results in a "minimum detectable target size" of

$$A_T = 318{,}398 \text{ ft}^2 \text{ or } D_T = 637 \text{ ft.}$$

PROBLEMS ENCOUNTERED DURING THIS PERIOD

No problems to report at this time.

WORK TO BE PERFORMED DURING THE NEXT PERIOD

Radiometric sky measurements will be completed during this period. The AMMS will be packed and shipped to Lockheed Palo Alto Research Laboratory for arrival at NASA/AMES Research Center by late August.

Monthly Letter Report No. 4

Report Period

16 July through 16 August 1983

Report Prepared
August 18, 1983

ADVANCED MICROWAVE MOISTURE SOUNDER

J.A. Gagliano

Subcontract No. SB80C6800R
(A-3527)

Prepared For

Lockheed Research Laboratories
3251 Hanover Street
Palo Alto, CA 94304

Prepared BY

Engineering Experiment Station
Georgia Institute of Technology
Atlanta, Georgia 30332

WORK PERFORMED DURING THIS PERIOD

The AMMS system tests in preparation for the September 1983 ER-2 data flights were completed. The tests included a set of sky measurements performed on the rooftop of the Baker Building located on Georgia Tech's campus. The purpose of these measurements was to calibrate the AMMS instrument while viewing a "cold sky" background. In addition, a set of atmospheric attenuation data under varying weather conditions was obtained. Table 1 is a sample plot of sky brightness temperatures obtained over a scan angle of 46.8 degrees (26 pixels) using the AMMS 94/183 GHz imaging radiometer. The table includes a 94 GHz pixel printout for the 26 distinct beamspot positions obtained over a total scan time of about 1.5 seconds. Pixel 1 represents an angular position of 24.3 degrees at the beginning of the scan, whereas pixel 26 represents 22.5 degrees at the end of the scan. Each of the six columns shown in the table represents a single scan and the "AVG" column is the average brightness temperature for six scans (9.0 seconds total time) at each pixel position. This same format is repeated for the three 183 GHz data channels.

PROBLEMS ENCOUNTERED DURING THIS PERIOD

No significant problems occurred during this period.

WORK TO BE PERFORMED DURING THE NEXT PERIOD

The AMMS system will be packed for ground shipment to Lockheed Palo Alto Research Laboratory. The system is scheduled for arrival at Lockheed by 1 September 1983 in time for the AMMS/ER-2 data flights presently scheduled for the period of 12 September to 30 September 1983. Georgia Tech will provide field support during the data flights which will originate out of the NASA AMES Research Center at Moffett Field, California.

Table 1. AMMS 94/183 GHz Scanning Radiometer Pixel Printout of Sky Brightness Temperatures Under Clear Weather Conditions

94 GHZ							
PIX	1	2	3	4	5	6	AVG
1	105	108	105	106	105	107	106
2	102	102	104	101	103	105	103
3	104	103	98	104	98	103	102
4	101	101	100	103	97	103	101
5	105	104	99	100	99	101	101
6	100	101	102	102	97	103	101
7	101	100	100	99	103	103	101
8	101	103	101	101	100	100	101
9	98	100	99	99	99	96	99
10	97	95	97	103	103	99	99
11	100	99	99	96	98	99	99
12	101	97	98	97	100	102	99
13	98	97	98	100	96	100	98
14	102	98	99	100	97	98	99
15	95	97	98	98	99	94	97
16	96	98	95	97	95	96	96
17	99	98	97	96	100	98	98
18	99	98	98	101	97	98	99
19	99	100	98	100	99	102	100
20	98	100	96	99	99	102	99
21	96	97	100	99	101	101	99
22	99	103	98	97	101	97	99
23	102	102	100	100	97	96	100
24	100	100	101	102	103	101	101
25	102	103	104	103	102	102	103
26	105	103	[illegible]	100	103	102	102

183/1 GHZ							
PIX	1	2	3	4	5	6	AVG
1	295	296	298	295	292	290	294
2	292	295	295	294	298	288	294
3	295	[illegible]	297	294	293	296	295
4	295	293	299	294	294	291	294
5	291	[illegible]	290	297	292	292	293
6	292	297	300	299	292	291	294
7	300	298	299	297	294	297	297
8	291	294	295	291	293	294	294
9	292	292	297	292	295	293	293
10	292	292	[illegible]	291	296	296	294
11	297	295	295	294	291	295	295
12	295	295	295	294	293	293	294
13	293	296	298	299	294	293	296
14	[illegible]	294	[illegible]	296	291	290	292
15	292	[illegible]	290	296	290	295	294
16	[illegible]	291	[illegible]	296	292	291	294
17	294	[illegible]	[illegible]	295	290	293	294
18	293	[illegible]	[illegible]	295	296	290	294
19	294	[illegible]	[illegible]	293	292	288	293
20	295	293	294	292	295	291	293
21	293	291	[illegible]	292	295	[illegible]	295
22	293	295	[illegible]	293	296	294	294
23	290	[illegible]	[illegible]	[illegible]	293	293	293
24	[illegible]	294	[illegible]	[illegible]	291	[illegible]	295
25	293	291	294	[illegible]	294	289	292
26	293	[illegible]	[illegible]	294	291	[illegible]	293

183/5 GHZ							
PIX	1	2	3	4	5	6	AVG
1	299	296	299	300	293	298	297
2	295	295	293	300	298	299	297
3	299	295	297	298	301	297	298
4	301	298	299	295	297	299	298
5	293	299	299	299	301	299	298
6	294	299	300	300	294	294	297
7	296	299	294	296	296	296	296
8	301	300	295	298	294	298	298
9	296	296	296	299	297	295	296
10	293	295	295	297	299	294	295
11	296	299	294	297	296	298	297
12	293	[illegible]	296	294	296	296	295
13	297	298	295	293	299	298	295
14	299	297	295	296	294	299	297
15	292	296	292	297	295	299	295
16	296	296	297	300	295	295	296
17	294	295	294	299	294	292	295
18	296	295	293	293	297	291	294
19	296	294	293	295	296	296	295
20	291	294	293	294	294	295	294
21	296	295	298	300	302	295	296
22	302	295	296	293	295	295	296
23	294	294	297	297	294	297	296
24	294	295	300	295	294	291	297
25	300	301	297	[illegible]	292	298	298
26	297	293	298	295	296	294	295

183/10 GHZ							
PIX	1	2	3	4	5	6	AVG
1	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	275
2	274	[illegible]	[illegible]	270	277	270	272
3	265	[illegible]	[illegible]	[illegible]	272	271	269
4	273	[illegible]	[illegible]	[illegible]	277	[illegible]	275
5	[illegible]	[illegible]	[illegible]	[illegible]	264	[illegible]	273
6	[illegible]	[illegible]	[illegible]	[illegible]	265	[illegible]	269
7	[illegible]	[illegible]	[illegible]	[illegible]	267	277	272
8	[illegible]	[illegible]	[illegible]	[illegible]	269	274	268
9	[illegible]	[illegible]	[illegible]	[illegible]	271	272	271
10	[illegible]	[illegible]	[illegible]	[illegible]	266	[illegible]	268
11	274	[illegible]	[illegible]	[illegible]	[illegible]	272	270
12	[illegible]	[illegible]	[illegible]	[illegible]	271	268	270
13	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	270
14	[illegible]	[illegible]	[illegible]	[illegible]	271	[illegible]	271
15	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	267	268
16	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	271
17	[illegible]	[illegible]	[illegible]	[illegible]	270	272	267
18	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	277	271
19	264	[illegible]	[illegible]	[illegible]	274	274	268
20	267	[illegible]	[illegible]	[illegible]	270	266	267
21	[illegible]	[illegible]	[illegible]	[illegible]	272	272	272
22	[illegible]	[illegible]	[illegible]	[illegible]	267	261	268
23	[illegible]	[illegible]	[illegible]	[illegible]	263	[illegible]	269
24	[illegible]	[illegible]	[illegible]	[illegible]	271	[illegible]	[illegible]
25	[illegible]	[illegible]	[illegible]	271	274	272	271
26	[illegible]	[illegible]	[illegible]	[illegible]	270	[illegible]	275

Monthly Letter Report No. 5

Report Period

16 August through 16 September 1983

Report Prepared

September 16, 1983

ADVANCED MICROWAVE MOISTURE SOUNDER

J.A. Gagliano

Subcontract No. SB80C6800R
(A-3527)

Prepared For

Lockheed Research Laboratories
3251 Hanover Street
Palo Alto, CA 94304

Prepared BY

Engineering Experiment Station
Georgia Institute of Technology
Atlanta, Georgia 30332

Work Performed During This Period

The AMMS system was shipped to Lockheed Palo Alto Research Laboratory and was delivered to NASA-AMES Research Center in Mountain View, California. Georgia Tech provided field support of the AMMS at NASA/AMES beginning with the ER-2 aircraft electrical integration tests in mid-September. Field support efforts included the engineering test flight and the follow-up data flights onboard the ER-2 research aircraft.

Problems Encountered During This Period

No significant problems to report at this time.

Work to be Performed During the Next Period

The AMMS/ER-2 data flights will be completed by 30 September 1983. The AMMS system and its associated ground support computer will remain at NASA/AMES under agreement between Lockheed Research Laboratory and NASA. Table 1 of the designated "Memorandum of Agreement" is included for reference purposes.

Table 1

MEMORANDUM OF AGREEMENT

National Aeronautics and Space Administration
and
Lockheed Palo Alto Research Laboratory

NASA agrees to lend the Advanced Microwave Moisture Sounder (AMMS) 94/183 GHz radiometers to LPARL on a no-cost-to-NASA basis for the period beginning on/about August 1, 1983, until no later than November 25, 1983, for flight missions aboard NASA's ER-2 aircraft from NASA Ames Research Center, Mountain View, California and a time period following the flights. NASA will provide LPARL with data at cost from the other instruments flown on the ER-2 flights. The AMMS is presently located at the Georgia Institute of Technology in Atlanta.

In return, LPARL will: assume the costs of shipping the AMMS from its present location to LPARL and returning it to the same location; assume the costs of designing, developing, and implementing the installation of the AMMS in the ER-2 aircraft; agree to loan NASA any AMMS installation fixtures for the ER-2 aircraft for possible future flight missions; assume the cost of contracting for operation of AMMS by Georgia Institute of Technology personnel during the loan period; assume the cost of damage or loss insurance on the AMMS in the amount of $500,000; provide NASA with AMMS data from the flights; return the AMMS to NASA in its present operable condition.

John Theon, Acting Chief
Atmospheric Dynamics and
Radiation Branch, Code EE-8
for NASA Headquarters

Harold A. Malliott, Staff
Scientist for Lockheed Palo
Alto Research Laboratory

Monthly Letter Report No. 6
Report Period

16 September through 16 October 1983

Report Prepared
October 14, 1983

ADVANCED MICROWAVE MOISTURE SOUNDER

J. A. Gagliano

Subcontract No. SB80C6800R
(A-3527)

Prepared For

Lockheed Research Laboratories
3251 Hanover Street
Palo Alto, CA 94304

Prepared By

Engineering Experiment Station
Georgia Institute of Technology
Atlanta, Georgia 30332

Work Performed During This Period

The AMMS participated in the ER-2 data flights at NASA AMES Research Center from 12 September to 4 October 1983. A total of six data flights and one checkout flight were performed during the field support effort.

Problems Encountered During This Period

The AMMS experienced a common problem throughout the NASA ER-2 data flights resulting in a minimum amount of data collected. The external symptom was that the flight cartridge recorder quit storing data about 5 to 10 minutes after initial start-up. Efforts were made to recycle the AMMS power in 30 minute increments to allow for instrument cooling at aircraft altitude. The results were the same, i.e. approximately 5 minutes of data storage with each power cycle spaced 30 minutes apart. Troubleshooting efforts revealed that the flight recorder internal power supply voltage levels were low. Lockheed Research Labs returned the recorder to the vendor (Innovatice Data-San Diego, CA) for repair.

Work to be Performed During the Next Period

Due to the recent problems encountered by the AMMS during the NASA ER-2 data flight, a request for extending the current contract end date will be made. A request of an additional three months (until 31 January 1984) for contract end date will be sought to allow sufficient time to complete the Lockheed ER-2 data flights.

Monthly Letter Report No. 7
Report Period

17 October through 16 November 1983

Report Prepared
December 19, 1983

ADVANCED MICROWAVE MOISTURE SOUNDER

J. A. Gagliano

Subcontract No. SB80C6800R
(A-3527)

Prepared For

Lockheed Research Laboratories
3251 Hanover Street
Palo Alto, CA 94304

Prepared By

Engineering Experiment Station
Georgia Institute of Technology
Atlanta, Georgia 30332

Work Performed During This Period

The AMMS flight recorder was repaired by Innovative Data - San Diego, California and was returned to NASA AMES Research Center for integration into the AMMS system. Tests performed by Lockheed personnel in the laboratory at NASA AMES revealed that the AMMS was not functioning properly. A joint decision was made between Georgia Tech and Lockheed Research Lab to return the AMMS to Atlanta for rework pending the arrival of additional funds on the current contract.

Problems Encountered During This Period

A request by Georgia Tech for additional funds to repair the AMMS was submitted to Lockheed. However, as of the end of this reporting period, no funds from Lockheed were received. Consequently the investigation into the problems with the system have been delayed.

Work to be Performed During the Next Period

The AMMS investigations and rework will begin as soon as the additional funds arrive at Georgia Tech.

Monthly Letter Report No. 8

Report Period
17 November 1983 through 31 January 1984

Report Prepared
January 24, 1984

ADVANCED MICROWAVE MOISTURE SOUNDER

J. A. Gagliano

Subcontract No. SB80C6800R
(A-3527)

Prepared For
Lockheed Research Laboratories
3251 Hanover Street
Palo Alto, CA 94304

Prepared By
Engineering Experiment Station
Georgia Institute of Technology
Atlanta, Georgia 30332

Work Performed During This Period

The AMMS was repaired and tested during this period. Two major problems were discovered. The 40 pin socket for the main processor located on the CPU board was faulty and was replaced. Secondly, the "bootstrip" PROMS for the AMMS system were replaced with back-up units. After these two changes were made, the AMMS functioned properly during laboratory tests at Georgia Tech. A test tape was run on the system prior to shipping the system to Lockheed Research Lab for additional ER-2 data flights.

Georgia Tech personnel provided field support at NASA/AMES during the ER-2 data flights performed the week of 16 January 1984. Data collected from flights on the 19th and 20th of January were transferred to reel-reel tapes and given to Lockheed for further data analysis.

Problems Encountered During This Period

No problems to report at this time.

Work To Be Performed During the Next Period

The technical efforts originally proposed under this contract have been completed. As originally agreed upon by Lockheed Research Laboratory and NASA, the AMMS will be returned to Georgia Tech by Lockheed at the completion of this contract.